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Confirmation of the Occurrence of *Myrmica rubra* (Hymenoptera, Formicidae) in Japan, with Taxonomic and Ecological Notes

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Confirmation of the Occurrence of *Myrmica rubra* (Hymenoptera, Formicidae) in Japan, with Taxonomic and Ecological Notes[1)]

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Abstract The occurrence of *Myrmica rubra* in Japan is confirmed. Taxonomic and ecological notes on *M. rubra* are given. Comparisons of Japanese *M. rubra* with European *rubra* and Japanese *M. ruginodis kotokui* are made.

The myrmicine ant *Myrmica rubra* was first reported by FOREL (1901) from Japan under the name *M. laevinodis*, who stated the specimen as absolutely typical. This record was based on a female from Sapporo, Hokkaido, sent by M. MATSUMURA, in whose collection I could find out no *M. rubra* specimen among the material from Hokkaido. The taxonomy of *M. rubra* and *ruginodis* seems somewhat confused at that time. For these reasons there is some possibility that FOREL's record may be of *M. ruginodis kotokui* or allies. WHEELER (1906, 1928) only cited or listed this record of FOREL, and YANO (1910) listed this species probably following FOREL (1901) and WHEELER (1906). In 1929 TERANISHI recorded *M. rubra laevinodis* (=*M. rubra*) from three localities of Hokkaido (Takigawa, Nokkeushi, and Wakkanai), but he searched for this species in vain in Sapporo, Otaru, and Jouzankei, and thus said that the species seemed to be uncommon. TERANISHI's (1929) record has been the latest. No one has reported *M. rubra* since then, despite there were HAYASHIDA's extensive works (1957, 1959, 1960, 1964, 1971, 1972; HAYASHIDA & MAEDA, 1960) on the distribution of ants in Hokkaido. Recently, however, in Hokkaido I found *M. rubra* workers walking on the ground. In addition, re-examination of my collection revealed the occurrence of *M. rubra* in Honshu.

Myrmica rubra (LINNAEUS)

(Figs. 1–4)

Formica rubra LINNAEUS, 1758, 580. Type area: Europe.
Myrmica laevinodis NYLANDER, 1846, 927–928, pl. 18, figs. 5, 31. Worker, female, male. Type area: Europe. [Synonymy by YARROW, 1955, 114.]

1) Taxonomy and ecology of the ants of Japan, (2).

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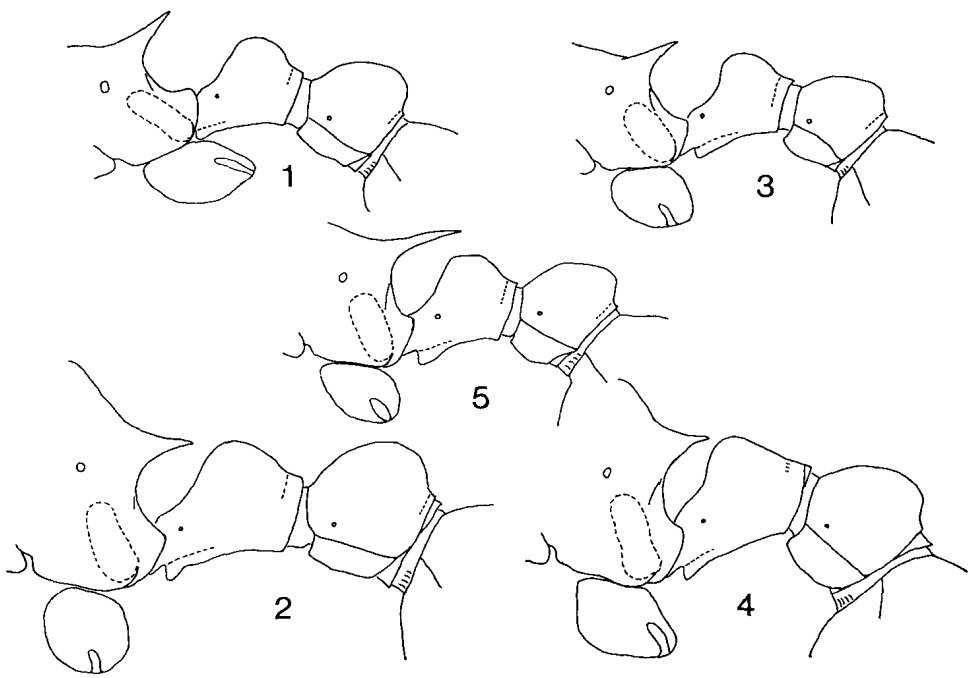
Myrmica laevinodis: FOREL, 1901, 371. [First record to Japan.]
Myrmica rubra laevinodis: EMERY, 1908, 170, figs. Worker, female, male.

Specimens examined. [Sakhalin Is.] 4 workers, Shisuka [Poronaisk], 14–VII–1933, UCHIDA, OKADA & SAWAMOTO leg.; 1 worker, Kaiba-tô [Moneron Is.], 30–VII–1934, C. WATANABE & T. INOUE leg. [Etorofu Is.] 3 workers, Shana, 11–VII–1935, Y. SUGIHARA leg.; 2 workers, Rubetsu, 2–VII–1935, Y. SUGIHARA leg. [Hokkaido Is.] 7 workers, near Oikamanai-numa, Taiki-chô, Tokachi Region, 100 m apart from the sea, 20 m altitude, 28–VIII–1986, K. ONOYAMA leg.; 27 workers of the same colony, 5–X–1986, other data as for the former. [Honshu] 4 workers, Kamigamo, Kyoto, Kyoto Pref., 120 m alt., 19–IV–1973, K. ONOYAMA leg.; 3 workers and 3 female pupae of the same colony, 30–VI–1973; 7 alate females and many workers of the same colony, 29–VII–1973.

Comparison with European M. rubra. Sakhalinese and Japanese *M. rubra* (Figs. 1–2) differs from European *rubra* (Figs. 3–4) in several points. In the worker, 1) sculpture on trunk coarser and more irregularly rugose (in European *rubra* mostly longitudinally rugulose), 2) metapleural lobes a little more developed, 3)



Figs. 1–5. Petiole and postpetiole and neighboring parts in side view of *Myrmica* species. —— 1. *M. rubra* worker from Tokachi, Hokkaido. —— 2. *M. rubra* female from Kyoto, Honshu. —— 3. *M. rubra* worker from Skipton, Britain. —— 4. *M. rubra* female from Skipton, Britain. —— 5. Syntype worker of *M. ruginodis kotokui* FOREL from northern Japan.

petiole higher, 4) the slope in side view between the anterodorsal angle and posterior margin more raised, and 5) dorsa of the petiole and in particular the postpetiole rugulose and punctate (in European *rubra* very weakly rugulose, almost smooth and subshining). In the female, 1) sculpture coarser, in particular on the mesoscutum and postpetiole, and 2) petiolar dorsum in profile somewhat angular behind the anterodorsal angle (Fig. 2, compare with Fig. 4 of European *rubra* female). These differences may lead to give a subspecies name different from European populations. However, since the continental Russian populations have not been examined, I determine the specimens here examined as *M. rubra* for the present.

Distinction between M. rubra *and* M. ruginodis *in Europe*. The distinguishing characters of European *M. rubra* from *M. ruginodis* are as follows, which are summarized on the basis of SADIL (1951), COLLINGWOOD (1958, 1979), BOLTON and COLLINGWOOD (1975), and KUTTER (1977) and ascertained on European specimens by me. 1) Sculpture finer and weaker. 2) Propodeal spines shorter. 3) Infraspinal area smooth or very faintly striate (in *ruginodis* transversely striate). 4a) Dorsal surface of the petiole node in profile curves evenly into the posterior face, the two not separated by a posterior angle; 4b) the petiole node peaked or rounded above (in *ruginodis* the petiole node with flat surface above, which is separated from the posterior face). 5) Petiole and postpetiole almost smooth and shining above (in *ruginodis* rugose above).

Distinction between Japanese M. rubra *and* M. ruginodis kotokui. The characters used for distinction between European *M. rubra* and *M. ruginodis* can be applied for Sakhalinese to Japanese specimens. However, character (1) is almost useless to separate the *M. rubra* specimens of Sakhalin, the Kuriles, Hokkaido, and Honshu from Japanese *M. ruginodis kotokui* FOREL (syntypes in MHN-Geneva examined; Fig. 5). Sculpture in *M. rubra* is coarser than in European *rubra*, almost as coarse as in *M. ruginodis kotokui* and European *M. ruginodis*. It is very difficult to separate the two by character (3). Striation of infraspinal area in *M. ruginodis kotokui* is variable but weak compared with European *M. ruginodis*, and some specimens of *M. ruginodis kotokui* have almost the same condition as in Japanese *M. rubra*. Character (4a) is not powerful, because in *M. rubra* and *M. ruginodis kotokui* the shape of petiole approaches to each other, the distinction between the two becoming difficult to some degree (compare Fig. 1 with Fig. 5). Character (5) is also not decisive, because in *M. rubra* specimens from Sakhalin to Honshu the petiole and postpetiole are weakly to moderately rugulose. Therefore only characters (2) and (4b) are useful. However, it should be noted that some specimens of *M. ruginodis kotokui* have propodeal spines as short as those of *M. rubra*. In dorsal view, character (4b) may be easily recognized. In the worker, the presence of two or three transverse ridges at the posterodorsal angle of petiole in *M. ruginodis kotokui*, instead of weak rugulae, at most one or two weak transverse ridges in *M. rubra* may help the distinction. Characters of Japanese *M. rubra* to be added are the yellowish body color which is apparent to the naked eye in the

field (though a few specimens with light brown, not yellowish body), and the gastral tergite I having almost to entirely no costulae near the postpetiole (although this character is also useless in some cases). In conclusion, *M. rubra* of Sakhalin to Honshu may be separated from *M. ruginodis kotokui* by 1) yellowish body, 2) less raised posterodorsal surface of mesonotum, 3) shorter propodeal spines, and 4) more rounded summit of petiole. In the female, *M. rubra* is characterized by 1) head to postpetiole reddish brown (in *M. ruginodis kotokui* medium to blackish brown), and 2) propodeal spines shorter.

The Kamigamo (Kyoto) specimens were determined as *M. ruginodis* by MORISITA and ONOYAMA (1974). I examined them, which have yellowish body color, and regarded as *M. rubra*. MORISITA and ONOYAMA (1974) stated that *M. ruginodis* (here I regard as *M. ruginodis kotokui*) appears above 600–700 m in altitude in Central Japan including Kyoto Prefecture. Also from the viewpoint of vertical distribution, the Kamigamo specimens taken at 120 m above sea level seem to be *M. rubra*. Kamigamo (Kyoto) has thus become the southernmost locality of *M. rubra* in Japan. *M. rubra* is new to Sakhalin and the Kuriles, respectively. The localities recorded here seem to indicate that *M. rubra* is mainly distributed near the coast. COLLINGWOOD (1979) wrote, "*Myrmica rubra* is a lowland species often abundant where it occurs in sheltered valleys, usually in alluvial soil by riversides and on the coast". In the coastal areas of northern and eastern Hokkaido, *M. rubra* is likely to be found in future.

The nest of *M. rubra* in Oikamanai-numa, located on the southeastern coast of Hokkaido, was found in the soil covered with a small alpine shrub, *Empetrum nigrum* var. *japonicum*, though without larvae. The Kamigamo colony was detected in the soil 10 cm deep under the grass root in the area dominated by *Miscanthus sinensis* and *Erigeron annuus*. It produced alate females in July, the same season as in Britain (BOLTON & COLLINGWOOD, 1975). The workers of the colony were aggressive and one stung me.

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